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F. M. EVANS

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LIQUID FUEL INJECTION PUMPS FOR ENGINES

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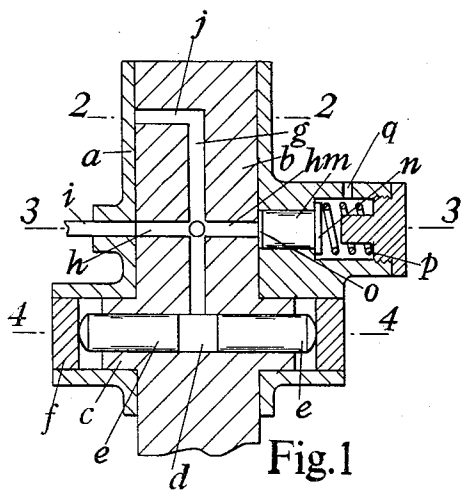


Fig. 1

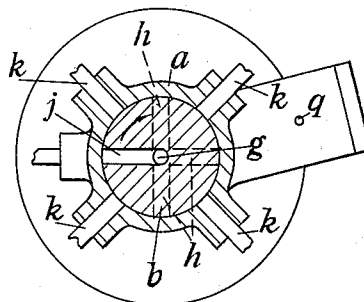


Fig. 2

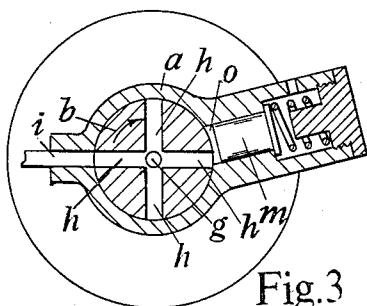


Fig. 3

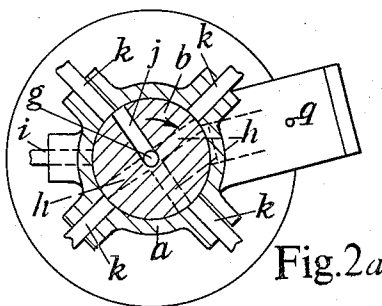


Fig. 2a

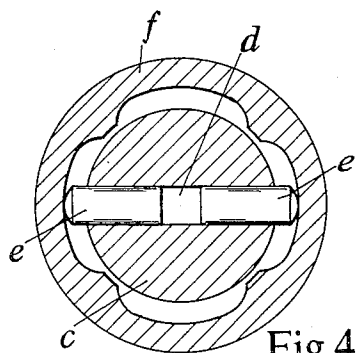


Fig. 4

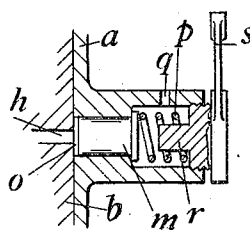


Fig. 5

Inventor
F. M. Evans

By *Glasco & Downing* Attorneys

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LIQUID FUEL INJECTION PUMPS FOR ENGINES

Fraser Mackie Evans, Acton, London, England, assignor
to C. A. V. Limited, Acton, London, England

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1 Claim. (Cl. 103—2)

This invention relates to liquid fuel injection pumps for internal combustion engines, the pumps being of the type comprising a rotary distributor for connecting the pump successively to the different cylinders of the engine and also of the type in which no non-return valves are provided in the delivery passages.

The object of the invention is to provide in such a pump a simple device for relieving residual pressure in the fuel delivery pipes after each discharge, the relief being required for the prevention of dribble at the injection nozzles in the engine cylinders.

The invention comprises a pump of the type aforesaid having in its body part adjacent to the rotary distributor, a cylindrical cavity the entrance to which is controlled by the distributor, and a spring loaded plunger in the said cavity, the arrangement being such that at the end of, or shortly before the end of, each discharge stroke of the pump the distributor establishes communication between the said cavity and the then associated outlet, so that the residual pressure in the said outlet can be relieved by movement of the plunger, the liquid fuel received by the cavity being subsequently returned to the pump under the action of the spring acting on the plunger.

In the accompanying drawings, Figure 1 is a longitudinal section illustrating a pump embodying the invention.

Figure 2 is a cross section on the line 2—2 of Figure 1.

Figure 2a is a similar view to Figure 2 showing the rotor in a different angular position.

Figures 3 and 4 are cross sections taken respectively on the lines 3—3 and 4—4 of Figure 1.

Figure 5 is a fragmentary view illustrating a modified form of the pressure relief device.

Referring to the drawings, the pump there shown comprises a body part *a* which contains a rotor *b*. On the rotor is formed an enlargement *c* which serves as the pump barrel. One end of the rotor extends beyond the body part and receives motion from any convenient source. The other end of the rotor serves as the distributor.

In the part *c* is formed a diametrically disposed bore *d* which contains two pump plungers *e*, and in the body part is included a cam ring *f* with which the outer ends of the plungers co-operate.

In the distributor are formed an axial bore *g* which extends from the centre of the bore *d*, four radial fuel inlet ports *h* which communicate in turn with a single fuel inlet *i* in the body part, and a single radial outlet port *j* which communicates with each in turn of four fuel outlets *k*.

The arrangement is such that rotation of the rotor

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causes fuel to be intermittently drawn into the space between the adjacent ends of the plungers *e* and subsequently discharged in turn through the outlets *k* to the associated injection nozzles (not shown).

According to the invention there is provided in the body part *a* and in the plane of the ports *h*, a small lateral cavity *o* which is open at its inner end and which contains a plunger *m*. At the end of the plunger remote from the open end of the cavity is formed a head *n* which is contained in a larger part of the cavity, the latter containing a weak spring *p* which holds the plunger in its normal position. The cavity *o* is provided with a vent *q*.

The arrangement is such that at or near the end of each discharge action of the pump the open end of the cavity *o* is put into communication with an adjacent closed inlet port *h*, thence through the bore *g* and port *j* with the discharge passage *k* through which liquid fuel is then being discharged to the engine. The effect of this condition, which is illustrated in Figure 2a, is to enable the residual pressure in the discharge pipe communicating with the cavity to be relieved by movement of the plunger *m* under the action of this pressure and against the action of the spring *p* acting on the plunger. In this respect it will be understood that as communication between the cavity *o* and one of the inlet ports *h* is established before communication between the port *j* and any one of the discharge passages *k* is interrupted, and as the spring *p* acting on the plunger *m* in the cavity is weak, the residual pressure in the discharge passage communicating with the cavity will, as a result of the movement of the plunger against the action of its loading spring, be reduced sufficiently to prevent dribble at the associated injection nozzle. Later the cavity is isolated by a plain unported peripheral portion of the distributor, and during the next suction action of the pump this liquid is returned through the distributor to the pump by the pressure of the spring on the plunger.

To enable the amount of liquid accommodated in the relief cavity to be varied, there is provided an adjustable stop *r* as shown in Figure 5. This stop *r* is arranged in screw-thread connection with the body part so that by actuation of an external lever *s* the position of the inner end of the stop can be adjusted for varying the range of free movement of the plunger *m*. This adjustment is also useful in enabling an additional amount of fuel to be supplied to the engine when starting.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

A liquid fuel injection pump comprising in combination a hollow body provided with a fuel inlet, a plurality of fuel outlets, and a cylindrical cavity open at one end to the interior of the body, a spring-loaded plunger in the cavity, and a rotary distributor mounted in the body, and having therein a pumping chamber, an axial passageway open at one end to the pumping chamber, another passageway extending between the axial passageway and the outer periphery of the distributor in a plane containing the fuel outlets of the body, and additional passageways extending between the axial passageway and the outer periphery of the distributor in another plane containing the fuel inlet and the cylindrical cavity of the body, whereby, during rotation of the distributor, communication is intermittently established between the fuel inlet and the pumping chamber, between the pumping chamber and each fuel outlet in turn,

and between the cylindrical cavity and both the pumping chamber and each fuel outlet in turn, the cavity being arranged so that communication thereof with the pumping chamber and each fuel outlet in turn is established through the associated passageways in the distributor preparatory to isolation of each fuel outlet from the pumping chamber by the distributor, thereby enabling residual pressure at each fuel outlet to be relieved by liquid fuel flow from the distributor into the cavity against the action of the spring-loaded plunger which subsequently returns the liquid fuel from the cavity to the distributor.

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